Multidisciplinary Team Assessment

2007 – 2008 Academic Year
Data taken in May 2008 and compiled by Dr. Jenna Carpenter at Louisiana Tech University

The ENGR 120 – 122 integrated freshman engineering sequence is required for all engineering majors at Louisiana Tech University. One of the goals of this sequence is to provide students with both instruction and opportunities to function on multi-disciplinary teams. During this year-long sequence, students participate in approximately seven multidisciplinary team-based projects. At the end of the year, a Design Expo held in which all ENGR 122 student teams make presentations of their final team project. Students are evaluated on their projects, presentations and team skills by panels of external and internal evaluators. The evaluator assessment of team skills focuses on aspects of students' ability to function effectively on multidisciplinary teams that can be reasonably assessed by the external evaluators during the interviews. The assessment focuses on five areas of team function: effectiveness of collaboration, team communication skills, ability to work together to convey ideas, readiness to accept feedback, and ability to use team decision-making processes in solving their problem. The evaluator assessment instrument is based on the work of the NSF-supported project, Engineering Education: Assessment Methodologies and Curricula Innovation, by Larry Shuman, Mary E. Besterfield-Sacre, Harvey Wolfe, Cynthia J. Atman, Jack McGourty, Ronald L. Miller, Barbara M. Olds, and Gloria M. Rogers, which uses Bloom's Taxonomy to develop and organize a set of learning objectives for ABET Outcome 3d (functioning on a multidisciplinary team) (see http://www.foundationcoalition.org/home/keycomponents/assessment_eval/outcome_d.html). Table 1 shows the evaluator assessment of team function. In addition, evaluators are asked to indicate the number of engineering disciplines that were involved with the project. Table 2 shows the evaluator feedback on this question. This question provides a direct measure of student experience in functioning on multi-disciplinary teams. In addition, evaluators have an opportunity to provide additional comments relative to ability of students to function effectively on multidisciplinary teams. A complete list of comments is given in Table 3.

The five areas of team function all received very high ratings, with average ratings between 4.5 and 5.0 out of a 5.0 Likert scale, from 5 = strongly agree to 1 = strongly disagree. The average number of engineering disciplines involved in the projects was 2. Feedback from evaluators indicated that the wording of this question could be improved. Next year, plans include clarifying this question, which asks how many engineering disciplines were required to complete this project, as well as adding an additional question to determine the majors of the team members themselves. Evaluator comments were very positive. At this time, no adjustments in content appear to be necessary. Tracking this data over a period of several years may reveal trends that will be of additional assistance in improving training on functioning in multidisciplinary teams.

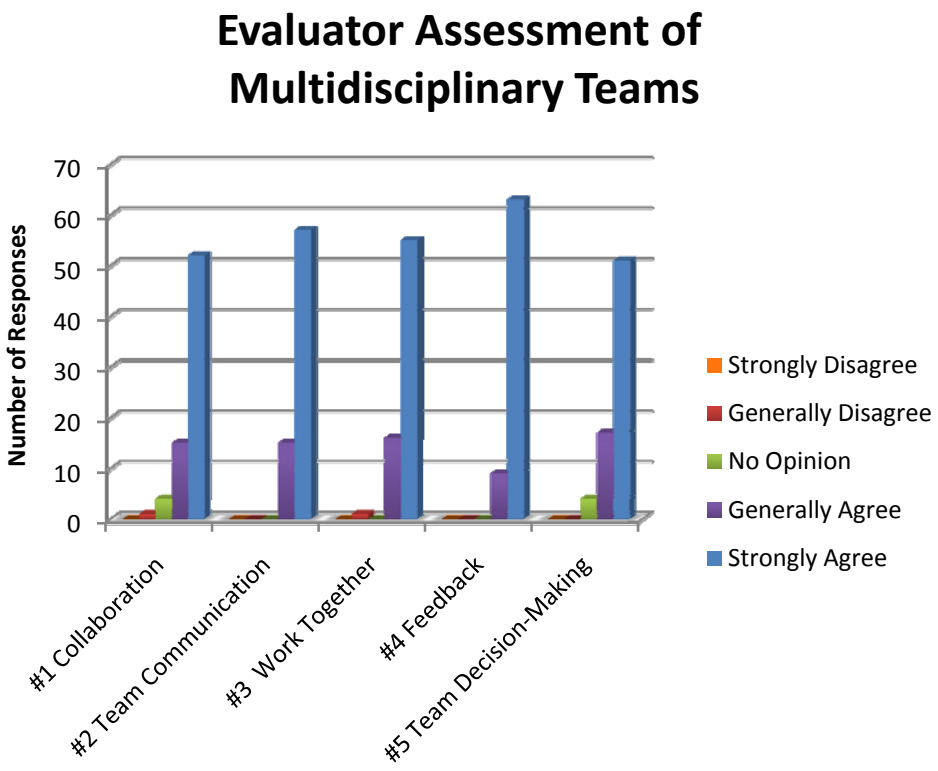

Table 1 - Evaluator Assessment of Student Ability to Function Effectively on Multidisciplinary Teams

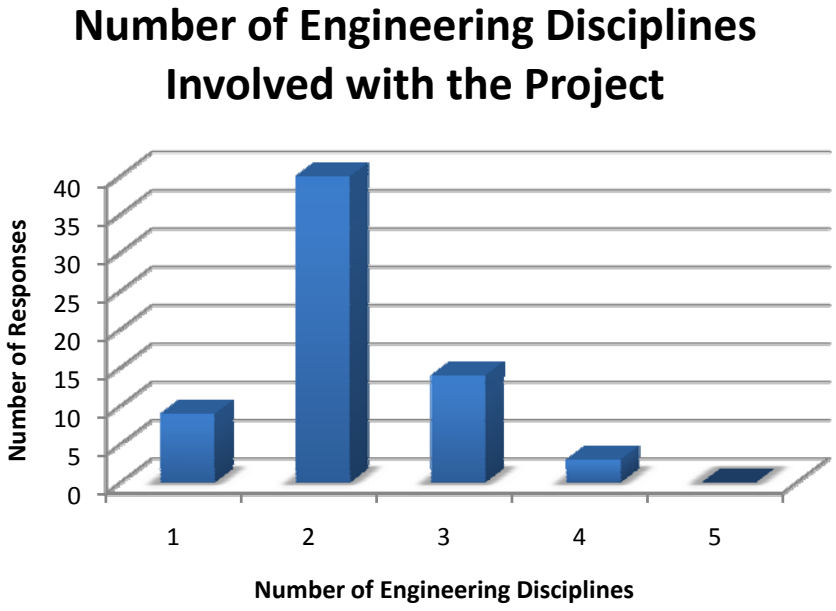

Table 2 - Evaluator Assessment of Number of Engineering Disciplines Involved in ENGR 122 Project

Evaluator Comments on Student Ability to Function on Multidisciplinary Teams
great
The team consists of 3 biomedical majors and 1 nanosystems major. All of them are females.
visuals were great - very well presented
impressive circuit and the demo worked - problem was well-addressed
visuals could use more color and larger fonts
very well-built, but could use a little more preparation for question sessions
almost forgot about treads, presentation could use more practice, but good ideas, well-built
great idea! could use more explanation of simple circuit
great idea and well-built
It is a good problem to fix and they seemed to explain their approach well.
Implemented IDEO process - terrific! Excellent presentation
great concept
appreciate the autonomy of vehicle - very well-prepared team
terrific concept; well-done project

Table 3 - Evaluator Comments on Student Ability to Function on Multidisciplinary Teams

In addition to collecting data from evaluators on the ability of students to effectively function on multidisciplinary teams, the students are asked to conduct a self-assessment at the end of the ENGR 120 – 122 sequence. Again, this assessment instrument is based on the work of the NSF-supported project, Engineering Education: Assessment Methodologies and Curricula Innovation, by Larry Shuman, Mary E. Besterfield-Sacre, Harvey Wolfe, Cynthia J. Atman, Jack McGourty, Ronald L. Miller, Barbara M. Olds, and Gloria M. Rogers, which uses Bloom's Taxonomy to develop and organize a set of learning objectives for ABET Outcome 3d (functioning on a multidisciplinary team) (see http://www.foundationcoalition.org/home/keycomponents/assessment_eval/outcome_d.html). This assessment instrument is more in-depth than the evaluator instrument and focuses on three major areas: collaboration and conflict management; team communication; and team decision-making. Student must respond to four questions under each area. Table 4 gives a summary of student feedback and Table 5 a list of additional comments provided by students.

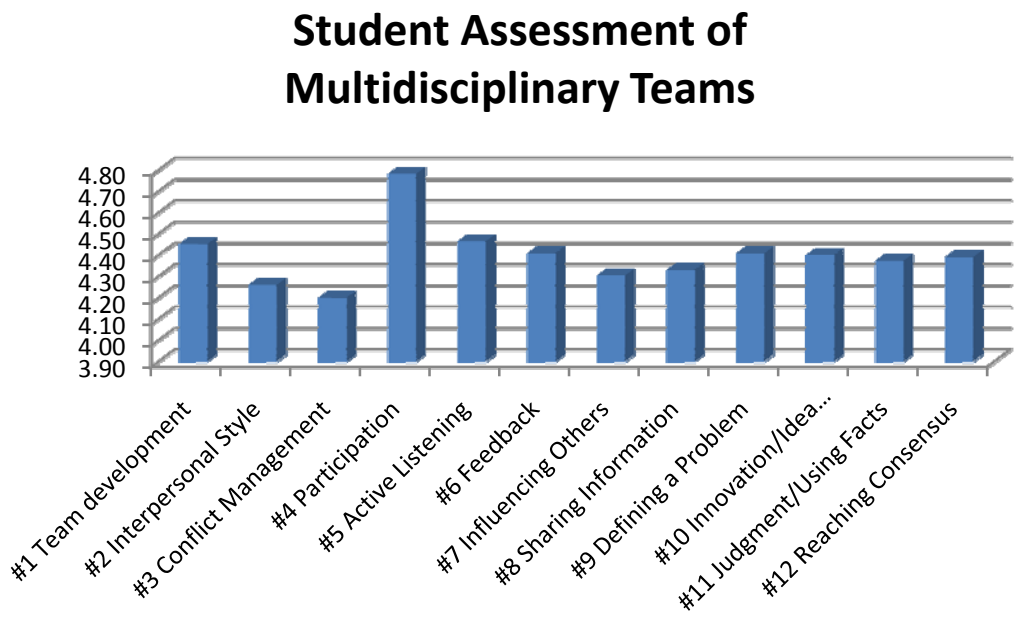

Table 4 - Student Assessment of Multidisciplinary Teams

All student ratings fell between 4.2 and 4.8 on a 5-point Likert scale. The highest ranked item was participation. The lowest ranked items included conflict management, interpersonal style and influencing others. The instructional material and activities relating to these items will be revisited to determine if there are ways to assist students in dealing more effectively with these issues.

Student Comments on Ability to Function on Multidisciplinary Teams
Two people isn't enough for a group. It should be 4.
Fun quarter. Very enjoyable.
I believe that a good team consists of members who have a balance of strengths and weaknesses. It's important that students consider this when choosing a team.
Some people are just hard to work with. They don't want to show up and push more work on the ones that are actually trying.
Course needs a few kinks worked out but the general principle is achieved.
It has been an overall excellent experience that I have learned a lot from.
The more people there are in a group, there is going to be a few people that work hard and then one or two that don't. Smaller groups are better.
From the freshman program, I have definitely learned a lot. I feel much more confident and comfortable with all the above from the survey.
I think given incoming freshman the opportunity to work in teams is a wonderful feature of the new curriculum that helps build leadership skills.
Sometimes, I felt like I needed more time and help from instructors. Some points were very chaotic and unorganized. This will get better as time passes though. Fun classes!
Our instruction provided the background information needed to help us perform effectively in groups.
While working with teammates can be a rough job, it is a great experience that all freshman engineers

need to experience.
I feel that the multi-disciplinary work provides a chance to understand what lies inside each discipline.
Overall, I feel as though the ENGR 120-122 series has enshrined the concept of teamwork, and this can be applied anywhere in life. I can now study for all my classes in groups so that we can help each other when someone doesn't understand. This is something I was never able to do before now. I have also developed friendships with my classmates that are sure to last.
It was very difficult to work with unfamiliar people who were already well acquainted.
It is great to have people who are exceptional in a given area on your team, but that doesn't mean the other members cannot help in that area.
I have generally enjoyed the team projects throughout the year. Having a team-mate helps to solve problems that we have come across while working on our projects.
My work with multi-disciplinary teams has gone very well.
My teammate and I worked well together playing to our strengths and avoiding our weaknesses. We worked efficiently and effectively.
Very good class
Instead of having our hand held through a project (fish tank) and then suddenly let go for the team to identify and solve a problem an intermediate step could be for the team to be provided a problem, and the team could then come up with a unique way to solve the problem. For example, in ENGR 121, we could be provided newspaper, and be told to create a table using tubes of newspaper which could hold some weight. This could ease the transition into ENGR 122.
The project has been challenging but fun.
I enjoyed the 120 series in general, great job, enjoyed every project.
This is the best quarter of engr. that I have been through. I wouldn't change a thing.
I found this experience to be extremely valuable experience that will be used throughout my career as an engineer.
I liked working with a team.
I have found it difficult to motivate certain members to engage in team construction activities concerning our final project. 3 out of 4 participating is enough but it isn't a team - I hate to say it but I think she thinks that it’s the "boys" job to do all the dirty work while she does posters and other displays.

Table 5 - Student Comments on Ability to Function on Multidisciplinary Teams